Readability Metric for Colored Text

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GOAL
To develop a model that, given a piece of text with some color on some background color, assigns a readability score.

MOTIVATION
Currently, there exists no good measure for determining web text readability. Our algorithm, based on real human data, can fulfill the following applications.

• design rating
• design improvement
• design automation

EXAMPLES

Text: #3A70A7
Background: #FFFFFF
Score: 82/100
"Readable"

Text: #EDAEB5
Background: #FFBC58
Score: 7/100
"Not Readable"

METHOD
• Data collection via Amazon Mechanical Turk
  5500+ participants
  over 300,000 pairwise comparisons of images
• Data analysis
  production of a machine learning model that accurately quantifies color text readability

VALIDITY

Measurement Error
In all Mechanical Turk experiments, we included 3 black and white images. Two images were used to normalize the readability scores. The third image moved freely. Variability in its position was used to estimate measurement error.

Training Error from Weka
The graph to the left shows the difference between our expected values from our measurement and our model’s predictions on the training data.

Test Error from Weka
The graph to the left shows the difference between our expected values from our measurement and our model’s predictions on the test data.

MODEL
Below is our current best model for computing readability on a 100 point scale.

\[ 1.0 \times 10^{-1} \times |\Delta R| + 5.7 \times 10^{-1} \times |\Delta G| + 8.6 \times 10^{-2} \times |\Delta B| - 1.1 \times 10^{-2} \times \Delta B - 1.1 \times 10^{-3} \times \Delta G^2 - 1.5 \times 10^{-4} \times \Delta B^2 - 3.6 \]